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MORALITY BEFORE KNOWLEDGE

Agricultural development model and transformation: An economic perspective on rural development and technological innovation

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ABSTRACT
Background: Economic development aims to increase people's income gradually and sustainably, with a model that includes structural, institutional, and technological transformation. This study focuses on Siwal Village to examine the challenges of development and application of technology in the agricultural sector. **Methods:** This study uses a qualitative approach to understand the development conditions in Siwal Village, Baki District, Sukoharjo Regency. The research location was chosen purposively, namely Siwal Village, which has characteristics that are relevant for development analysis. Data collection techniques were carried out through in-depth interviews with various sources and literature studies to obtain supporting secondary data. The data obtained were analyzed using qualitative descriptions to describe the phenomena that occurred in the village, including structural, institutional, and technological changes. **Findings:** The results of the study show that Siwal Village has experienced significant structural changes, with the agricultural sector's contribution decreasing, while the industrial and service sectors have increased rapidly. In addition, institutional transformation has also occurred, with changes in the village economic management system and strengthening of local institutions. Agricultural technology has also been introduced, but its application is still limited due to the lack of knowledge and human resource capacity in managing the technology. **Conclusions:** The agricultural development process in Siwal Village needs to adopt the Diffusion model, which emphasizes the dissemination of efficient agricultural technology and training human resources to improve their ability to manage modern agriculture. With the application of appropriate technology and increasing community capacity, agricultural development in Siwal Village can improve and contribute to sustainable village economic welfare. **Novelty/Originality of This Study:** The novelty of the study lies in the combination of the economic development model with the Diffusion of Innovations theory, which describes the spread of new technologies in the agricultural sector.

KEYWORDS: agriculture; economic development; model of transformation.

1. Introduction

Economic development is a long-term process of change. It aims to gradually and sustainably increase people's real income. An increase in production over time, driven by economic growth, is one of the key indicators of successful national development. Economic development during this period can be characterized by structural changes that grow more rapidly than other sectors across the economy.

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According to Arthur Lewis's development model, underdeveloped economies consist of two traditional sectors, (1) the rural sector, where the marginal productivity of labor is zero due to population density. This condition enables Lewis to argue that the most productive industrial sector in the modern urban economy; (2) will not experience a loss in output if part of the surplus labor is transferred from the agricultural sector. Workplaces do not shift significantly within the subsystem, and this change in economic structure indicates a declining contribution from the agricultural sector, alongside a growing contribution from the industrial sector. Economic growth and rising income will shift people's consumption patterns away from agricultural products.

As income increases, people's needs shift from food (agriculture) to non-food goods (industry). The objectives of this study are to, (1) identify the general conditions and potential of Siwal Village, Baki District, Sukoharjo Regency; (2) examine the structural transformation in Siwal Village, Baki District, Sukoharjo Regency; (3) analyze the institutional transformation in Siwal Village, Baki District, Sukoharjo Regency; and (4) assess the technology transfer occurring in Siwal Village, Baki District, Sukoharjo Regency.

1.1 Agricultural development

Agriculture is an integral part of economic life, and as such, it is subject to pressure from various economic factors. This makes agriculture a crucial element of economic development. It encompasses business-related activities that fulfill human needs, such as livestock farming and crop cultivation. Agriculture demonstrates that agricultural economic development cannot be viewed solely from an economic perspective. This is due to the significant influence of institutional and technical aspects. Nevertheless, these aspects are frequently discussed in the context of economic development, especially in developing countries (Yuwonoe et al., 2019).

Agricultural development plays a vital role in both economic and national development. Studies on economic growth in various countries have shown a strong interconnection between the development of agriculture, industry, and services. The success of agricultural development—particularly in increasing people's income and ensuring the availability of staple food—can drive the growth of industry and services and accelerate structural transformation. Empirical evidence also suggests that the industrial sector becomes more robust when it is supported by advancements in a resilient and sustainable agricultural sector (Isbah & Iyan, 2016).

Agricultural development is essential for building a modern, efficient, and resilient economy. It contributes to both micro and macroeconomic aspects, influencing non-agricultural sectors such as industry, transportation, trade, and finance. The development process aims to enhance the quality of production, improve farmers' income and living standards, promote workforce expansion, and increase opportunities in trade and production.

Agricultural development not only focuses on supplying agricultural products to consumers, but also on increasing farmer income and business productivity. Achieving these goals requires sufficient financing and greater human involvement in areas such as livestock and plantation agriculture. Production and imports will continue to expand, and productivity is expected to increase steadily. However, if the development process is interrupted, it will come to a halt automatically (Hartanto, 2021).

1.2 Institutions

The concept of institutions has yet to find clarity in scientific discourse. Terms such as formal and informal organizations, institutions, associations, and others are often used interchangeably, despite referring to entities that are conceptually distinct yet overlapping. The notion of institutions tends to be more abstract, encompassing norms, ethics, and the underlying values that shape the spirit of an organization in relation to specific issues. In

contrast, organizations are more consistently defined in terms of structure, roles, objectives, and membership (Indarti, 2015).

Institutions play a vital role in regulating interpersonal relationships and managing production factors effectively. However, institutional aspects can sometimes act as barriers to agricultural development, particularly in developing countries. Institutional systems generally consist of two key components: the "rules of the game" and the mechanisms for enforcing those rules. These systems are often formally established and operated by government bodies, but can also include informal traditional norms upheld by the community. Although less formal, such norms are often predictable, reliable, and applicable in recurring contexts. Therefore, institutions can be well understood as a set of rules or procedures (Nuraini, 2016).

Institutional empowerment, particularly to address issues faced by farmers, is essential for strengthening agricultural institutions—especially in irrigation areas, which face unique strategic challenges. Leadership structures are typically established through regular elections, with administrators participating in formal institutional processes. Moreover, the formation of agricultural institutions has been coordinated to align with the potential and needs of group members, incorporating local wisdom and community-specific characteristics (Wahyuni, 2017).

2. Methods

Qualitative methods were employed for data collection. The research location was determined using a purposive sampling method, selected based on relevance to the study objectives. The choice of research location directly influenced the data collection techniques, the types of data gathered, and their sources. The study was conducted in Siwal Village, located in Sukoharjo Regency, Central Java. Data collection was carried out through two main approaches: interviews with key informants and a literature review. The interviews were conducted using a question-and-answer format, allowing for in-depth exploration of participant perspectives. The literature review served as a method for establishing a theoretical and contextual foundation by examining relevant written sources in a systematic and continuous manner.

The sources of data in this study are broadly categorized into primary and secondary sources. Primary data were obtained directly from interviews with key informants. Secondary data consisted of documented information such as village monographs and other graphic or textual materials related to Siwal Village. Both types of data were analyzed using a qualitative descriptive approach. This analysis was aimed at exploring and interpreting social events, phenomena, or situations in depth. The qualitative analysis techniques applied were intended to provide a comprehensive description of specific occurrences that had been studied extensively.

3. Result and Discusion

3.1 General condition of Siwal Village

Siwal Village is located in Sukohar Jorjori Subdistrict, Baki Regency, Central Java. Siwal Village lies on a lowland area with an elevation of 97 meters above sea level. Siwal Village consists of 17 neighborhood units (RT) and 4 community units (RW). The territorial boundaries of Siwal Village are as follows: to the north is Gentang Village, to the south is Duwet Village, to the west is Walu Village, and to the east is Manang Village.

The route and distance from Siwal Village to the subdistrict, regency, and provincial capitals are as follows: the distance to the subdistrict capital is 5 km, to the regency capital is 16 km, and to the provincial capital is 95 km. The travel time to the subdistrict capital is 15 minutes, to the regency capital is 30 minutes, and to the nearest health, governmental,

and economic facilities is 10 minutes. Siwal Village has 116 hectares of agricultural land with the potential for rice paddy cultivation.

The potential of Siwal Village lies in the sectors of agriculture, industry, and services. Agricultural potential in Siwal Village has been declining, as most of the agricultural land has been converted into residential and development areas. In addition, human resources in Siwal Village have shifted to the industrial and service sectors. Some agricultural land is still in use, but there is a lack of human resources to manage it. As a result, some landowners have sold part of their agricultural land.

3.2 Structural transformation in Siwal Village

Economic growth during this period is typically marked by structural transformation. Economic growth is evident in the faster development of certain sectors compared to others. Structural change refers to economic shifts characterized by low productivity and traditional structures. This condition can be seen in the declining contribution of the agricultural sector. Economic growth and rising income will alter society's consumption patterns for agricultural products, while increasing income will also change the demand for food.

The economic development of a region can be observed through several indicators. These indicators include various social and economic activities within the community. Economic activities in the community are driven by increasing demand for local goods and services within the economy of Siwal Village. The majority of the village population are farmers and laborers. Over time, the types of socio-economic activities in the region have changed. Non-agricultural occupations such as brick-making, herbal medicine vendors, private printing services, and administrators have emerged. Non-agricultural projects implemented in the Siwal Village Industrial Area have increased demand for clothing, food, and housing. Workers in the industrial area come not only from urban areas but also from Siwal Village. The income of rice farmers and livestock breeders is unknown; however, many farmers have migrated after finding more profitable work in the industrial sector.

Currently, economic activities in Siwal Village are dominated by the non-agricultural sector. This shift is due to the conversion of agricultural land into residential areas. The conversion of agricultural land has led to a decrease in food production, ultimately threatening food self-sufficiency. Economic change also affects the composition of labor demand across different sectors, as only a portion of the urban and rural population receives adequate attention. Additionally, Siwal Village faces challenges in recruiting farmers because many young people are not interested in farming or do not wish to become farmers.

The contribution of the agricultural sector in the Siwal area remains, although it has declined compared to previous periods. One reason why farmers shift to the non-agricultural sector is the significant production losses they face, including crop failure due to pests. However, the transition of workers from the agricultural to the non-agricultural sector does not always happen directly. Some rural workers move to non-agricultural sectors specifically to seek higher-paying jobs. This reflects the development of non-agricultural sectors—namely, the industrial and service sectors—in rural areas. Economic structural change is marked by a decline in the contribution of the agricultural sector, an increase in the contribution of the industrial sector, and a rise in the contribution of the service sector.

3.3 Institutional transformation in Siwal Village

This is a social system designed to achieve specific goals and focuses on the form and area of implementation—behavior, values, norms, and rules. Transformation is a process of change and requires the full contribution of all stakeholders. The transition cannot be rushed, but it must not be delayed either. It requires careful planning and implementation.

A weak national economy can be traced back to the weakness of rural economies, particularly due to the fragility of the supporting institutions. The future of the national village economy will become increasingly distant if traditional institutions, which have long supported the majority of the rural economy, do not accelerate the transition toward improvement.

The village agribusiness system, which involves a large number of people, requires enhanced mastery of resources, technological capability, business skills, economic infrastructure, social networks, and other components to accelerate community economic growth. Without intensive government intervention, it is difficult for rural economies to enter a modern economic stage that demands high competitiveness, making institutional transformation essential.

Our interviews in Siwal Village revealed that the financial institutional system has undergone changes. Initially, there was a Village Credit Cooperative (BKD), but it was dissolved in 2000 due to management difficulties, and a Community Empowerment Unit (UPK) was established. This transformation aimed to modernize financial management. UPK is a unit that carries out business activities in the form of savings and loan services, mandated by the Village Community Empowerment Program (PPMD) to enhance village self-reliance and reduce poverty. Other institutions such as Karang Taruna (youth organization), Posyandu (integrated health service post), and Gapoktan (association of farmer groups) have remained active from the past to the present. The interviews revealed that these three institutions have not yet undergone institutional transformation, indicating a need for research and appropriate management improvements so that their activities can be carried out effectively and efficiently in accordance with their intended purposes.

3.4 Technology transfer in Siwal Village

Technological advancement is an inevitable part of social life, especially with the ongoing development of science. Agriculture is one of the sectors significantly affected by technological progress. Population growth and the decreasing use of agricultural land are among the driving factors behind the advancement of technology and agricultural development, aimed at meeting basic societal needs and ensuring food security. In practice, technological advancement has spread across rural areas, not only in major cities, and the government has made various efforts to promote the adoption of technology in villages through technology transfer initiatives.

Siwal Village is one of the rural areas that has received technology transfer support from the government. In interviews conducted in Siwal Village, local authorities stated that the technology transfer includes the provision of tools such as tractors, automatic planters, drones, and equipment for spraying liquid fertilizers and pesticides. These tools are intended to help increase agricultural productivity. The agricultural machinery is distributed through farmer groups in Siwal Village.

The technology provided by the government, including drones, has been utilized by farmers in Siwal Village. However, because drones are used for spraying fertilizers and pesticides, many farmers have complained about the high operating costs. Some farmers also reported difficulties due to their inability to operate drones and issues with uneven spraying.

3.5 Agricultural development

The issues in Siwal Village include the shift of labor from the agricultural sector to the industrial sector (such as factory or construction workers) and the conversion of agricultural land, as farming is considered less profitable. The appropriate model for agricultural development in Siwal Village is the diffusion model. The diffusion model is a

method of increasing agricultural production through the dissemination of farming techniques, new crop varieties, technology, and farm management practices.

Siwal Village has implemented the diffusion model by adopting agricultural technologies as an effort to enhance agricultural development. However, the implementation has not been fully effective due to the lack of proper human resource development. Extension services and education on how to manage land using technology are necessary to increase production output.

4. Conclusion

Siwal Village faces agricultural development challenges, including a decline in the number of agricultural workers and the widespread conversion of farmland, as agriculture is perceived as unprofitable. This has led to a shift in the community's economic activities toward the non-agricultural sector, resulting in increased contributions from the industrial and service sectors in line with economic growth. Although many economic activities have moved to the non-agricultural sector, the village government continues to implement technology transfer initiatives in the agricultural sector by providing equipment such as tractors, automatic planting machines, and drones to support farming activities. However, some farmers are still unable to operate these tools due to low levels of knowledge and skills. Therefore, the most appropriate agricultural development model for Siwal Village is the Diffusion Model, which involves the application of technology accompanied by human resource development as an effort to enhance agricultural development.

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